Spring 1-2016

MCH 191.03K: Special Topic - Introduction to CNC Mills

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MISSOULA COLLEGE
UNIVERSITY OF MONTANA

COURSE NUMBER: MCH 127
COURSE TITLE: Introduction to CNC Mills
COURSE SCHEDULE: M-F
SEMESTER CREDIT: 4
PREREQUISITES: None
COREQUISITES: None
CONTACT HOURS: Lecture hours:
Lab hours:
INSTRUCTOR: James Mason
E-MAIL: james.mason@umontana.edu **PHONE:** 406-243-7646
OFFICE LOCATION: RPE/Machining/Welding Lab **OFFICE HOURS:** Use sign-up sheet

COURSE DESCRIPTION: This course provides instruction in the setup and operation of CNC mills. Student projects include specialty tooling and multi-axis machining. Students will also gain experience in process control. Topics include specialty tooling, multi-axis machining, process control, and laboratory exercises in part production.

STUDENT PERFORMANCE OUTCOMES / OCCUPATIONAL PERFORMANCE OBJECTIVES
Upon completion of this course, the student should be able to:

1. Know, understand, and demonstrate key aspects of CNC mill safety
2. Demonstrate safe setup and operation of vertical CNC mills
3. Perform machining processes to blueprint specifications
4. Calculate speeds and feeds for machining
5. Create operation, process, and inspection sheets
6. Use precision measuring instruments for layout and inspection
7. Setup and operate band saw, drill press, and milling machine for peripheral work
8. Perform machining processes such as cutting slots, bores and counter-bores, counter-sinks, threaded holes, reamed holes, and bolt patters via G-code programs
9. Use clamping, fixturing, and other holding devices

STUDENT PERFORMANCE ASSESSMENT METHODS AND GRADING PROCEDURES:

STUDENT EXPECTATIONS:
Students are expected to treat the class as they would a job in their field of study which means:

- Follow all safety rules and classroom or laboratory procedures
- Pay attention, take notes, and read and refer to the textbook
- Bring all required materials daily, or lose a percentage point per occurrence
- Participate in lab clean-up, which begins 10 minutes before the scheduled class end
- Participate in semester end lab clean-up, or lose all of the professionalism grade
- No food or drink, smoke-breaks, cell-phones or other personal multimedia in or during class

Each student will be assigned roles in addition to their normal duties as a student. Roles include but are not limited to:

- Safety Supervisors
- Layout Crib Cleanup
- Tool Crib Cleanup
- Equipment Cleanup

- Materials Cleanup
- Grind Area Cleanup
- Cleanup

PORTFOLIO: Students will organize notes, assignments, tests, quizzes, and projects into a 3-ring binder. (10% of Assignments grade)

COURSE GRADING SCALE:	IMPLIED FEATURE GRADING SCALE**:**
A = 90% - 100%	*A ± .000" - .002" of design specifications**
B = 80% - 89%	*B ± .0021" - .004" of design specifications**
C = 70% - 79%	*C ± .0041" - .007" of design specifications**
D = 60% - 69%	*D ± .0071" - .011" of design specifications**
F = <60%	*F > .011" of design specifications**

NOTE: Courses must be passed with a 70% (C-)' or greater to count toward degree/certificate requirements.

The following criteria will be used for grading. Grades will be posted periodically and will be available to students upon request during office hours.

1. **Assignments: 15%**
   a. **Due Assignments** are to be turned in before 5 minutes after the class is scheduled to begin, otherwise it will be considered Late Work*.
   b. **Late Work** will not be accepted unless absences are excused; and are due the following day.
   c. **Corrected Assignments** will be returned the Monday after they are corrected. If you are absent, acquire corrected assignments before or after class.
   d. **Missed Assignments** will be made available to students with excused absences only.

2. **Tests: 35%**
   a. Tests, quizzes, and pop quizzes will not be made up if missed.
   b. Moodle tests:
      i. Moodle tests are intended to prepare you for rigorous midterm and semester exams.
      ii. Tests are pass/fail
      iii. Safety tests:
         1. 3 attempts total, three strike rule
         2. Test scores >90% are required to be allowed to operate machinery
      iv. Subject tests:
         1. 3 attempts total, three strike rule
         2. Test scores >70% required to continue to operate machinery
      v. Available every Saturday at 12:00 AM prior to the week
      vi. Due every Sunday at 11:55 PM after the week
      vii. Practice tests: unlimited access

3. **Lab: 45%**
   a. Quality of project workmanship (see Feature Grading Scale)
   b. Quality of project measurement, processes, and inspection and quality control

4. **Professionalism: 5%**
   a. Work ethic (safety, work done on time, care of tools and equipment, etc.)
   b. Interpersonal skills (cooperation, leadership, participation, attitude, etc.)

ATTENDANCE POLICY:
It is the student's responsibility to utilize class time to acquire and maintain skills in preparation for quizzes, exams, and completion of assignments and projects. Students must attend all lab and equipment safety/training days to be allowed access to the lab. Failure to do so may result in removal from the course.

Notify the instructor of absence(s) before scheduled class time, via phone or email listed above. Absences are considered an "unexcused absence" unless a doctor's note is received. There will be no "make-up" for quizzes, tests, or assignments missed due to unexcused absences. "Excused absences" will receive a matching number of days excusal period as absent starting immediately upon your return. It is the student's responsibility to get caught-up before course work is due.

5 absences, arriving late, attending unprepared, or combination thereof will reduce the students' final course grade by one grade letter.

REQUIRED TEXTBOOKS:
CNC Programming Handbook, Peter Smid, 3rd ed., ISBN-13: 978-0831133474, ISBN-10: 0831133473

OPTIONAL TEXTBOOKS & SOFTWARE:
2015 Machinery Handbook, 29th Edition, ISBN-13: 978-0831129002, ISBN-10: 083112900X

NC Plot (education discounts available)

REQUIRED TOOLS & MATERIALS:
(Failure to bring required tools & materials on a daily basis will result in -1% grade penalty)

- P.P.E.: Safety glasses, closed-toed shoes, pants and short-sleeved shirt
- 3-Ring binder (dedicated to this course) with minimum 6 dividers or folders, and clear sheet jackets optional
- Calculator with SIN, COS, TAN (cellphones are not allowed during quizzes and tests)
- Permanent marker
- Scriber – tungsten carbide or high-speed steel (HSS)
- 6" steel rule
- 6" digital caliper (steel, not plastic) – thousandths (±0.001") graduations & precision
- 5/16" or 3/8" HSS lathe tool-bit
- ~½" HSS end mill (2, 3, or 4 fluted)

OPTIONAL TOOLS & MATERIALS:

- Deburring tool
- 12" Square combination set
- 15-0-15 dial test indicator set with magnetic base – ten-thousandths (±0.0001) graduations & precision
- 1-3" Micrometer set, ten-thousandths (±0.0001) graduations & precision
- Telescoping gages (Snap gages)
- Edge finder – single or double ended, ½" or 3/8" shank with ½" or 0.200" tip
- Dead blow mallet

ACADEMIC INTEGRITY: All students must practice academic honesty. Academic misconduct is subject to an academic penalty by the course instructor and/or a disciplinary sanction by the University. All students need to be familiar with the Student Conduct Code. The Code is available for review online at http://www.umt.edu/SA/VPSA/index.cfm/page/1321.

DISABILITY ACCOMMODATION: Eligible students with disabilities will receive appropriate accommodations in this course when requested in a timely way. Please contact me after class or in my office. Please be prepared to provide a letter from your DSS Coordinator. For more information, visit the Disability Services website at http://www.umt.edu/dss/ or call 406.243.2243 (Voice/Text).

COMMUNICATION: Communication is vital to your success in this course. Contact information is provided in this syllabus. As the Course Instructor, I try to answer all calls and e-mails promptly. Communicating with the Course Instructor is the Student's responsibility especially with regard to meeting deadlines. In general, late assignments are not accepted and exams cannot be made up. If an unforeseen event happens, please contact the Course Instructor immediately--and PRIOR to a deadline--to make alternative arrangements for meeting your class responsibilities.

MAIL POLICY AT UMONTANA: According to University email policy, an "employee must use only UM assigned student email accounts for all email exchanges with students, since such communication typically involves private student information." This means that you must send any correspondence through your GrizMail account. For more information on setting up and using your GrizMail account, visit the UMontana Information Technology Website. Go to IT email support. (http://www.umt.edu/it/support/email/studentemail.php)

NOTE: Faculty reserves the right to modify syllabi and assignments as needed based on faculty, student, and/or environmental circumstances.

GENERAL LAB SAFETY RULES
All students must agree to follow this non-inclusive list of safety rules and professional behavior guidelines.

Work Safely:
1. **Never work unsupervised**. All students must notify the instructor before and after working in the lab.

2. **Never work when impaired**, due to inadequate sleep or under the influence of alcohol or other substances.

3. **Never operate machinery without receiving proper instruction.**
   This includes but is not limited to passing Moodle safety tests and the proper management of machine setup, speeds, feeds, and depths of cut, for any given process.

4. **Exercise as many safety precautions as possible**, including wearing safety glasses and other protective clothing and accessories at all times when working in the lab, including demonstrations and cleanup.

5. **Clean spills IMMEDIATELY!**

Know what to do in case of an EMERGENCY:

1. **Know the locations of machine and laboratory emergency shut-off switches and/or power boxes.**

2. **Know the locations, eyewash station, fire extinguishers, fire exits, and first aid kits.**

3. **Report all personal injuries immediately.**

4. **Prevent chemical accidents by familiarizing yourself with the chemical(s) in the MSDS.**

Violations of General Lab Safety Rules:

- **1st offense:** Verbal warning.

- **2nd offense OR any serious infraction:** Student is unable to use the facility for one (1) full day of scheduled lab time immediately following the offense.

- **3rd offense OR any offense creating a dangerous situation:** Student may be subject to termination from the course.

My signature below indicates that I have read and understood the descriptions, policies and procedures stated in the syllabus for MCH 127 Introduction to CNC Mills:

Student Name (Print): _____

Student Signature: _____

Date Signed: _____